Methods for Analyzing Anisotropic Flow in Relativistic Nuclear Collisions*

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An approach to the study of anisotropic flow which is particularly suitable at high (AGS/SPS/RHIC) energies is presented. It uses the Fourier expansion of azimuthal distributions. The essence of the method is to first estimate the reaction plane. The estimated reaction plane we call the event plane. The Fourier coefficients in the expansion of the azimuthal distribution of particles with respect to this event plane are evaluated. Because the finite number of detected particles produces limited resolution in the angle of the measured event plane, these coefficients must be corrected up to what they would be relative to the real reaction plane. This is done by dividing the observed coefficients by the event plane resolution, which is estimated from the correlation of the planes of independent sub-events (sub-groups of the particles used for the event plane determination). The resolution obtained from the sub-events can be converted to that for the full event by means of the multiplicity dependence of the resolution which is shown in Fig 1. Also, if the detector does not have full azimuthal acceptance, the acceptance bias has to be removed in calculating the event plane by weighting with the inverse of the laboratory azimuthal distribution of the particles.

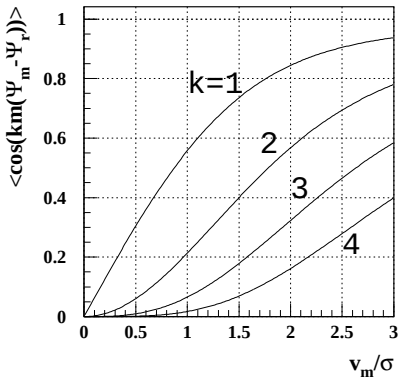

Figure 1. The event plane resolution for the n^{th} $(n=km)$ harmonic of the particle distribution with respect to the m^{th} harmonic plane, as a function of the signal/noise, v_m / σ.

Footnotes and References

* Condensed from A.M. Poskanzer and S.A. Voloshin, Phys. Rev. C 58, 1671 (1998).